

Serial No. 10/695,453  
Docket No. T36-159874M/RS  
(NGB.322)

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### REMARKS

Entry of this Amendment is proper because it does not raise any new issues requiring further search by the Examiner, narrows the issues on appeal, and is believed to place the present application in condition for immediate allowance.

Claims 1-3 and 7-23 are all the claims presently pending in the application.

Applicants gratefully acknowledge that claims 19, 20, 21, and 23 are allowed and that claim 22 would be allowable if rewritten in independent form.

However, Applicants submit that all of the claims (i.e., claims 1-3 and 7-23) are allowable for the reasons set forth below.

Applicants note that claims 2, 3, and 7-18 have not been rejected on prior art grounds. Therefore, Applicants submit that claims 2, 3, and 7-18 also should be allowable if the rejection under 35 U.S.C. § 112, second paragraph, is overcome.

Claims 1-3, 11, and 16 have been amended merely to define more clearly and particularly that the claimed electrode for a p-type Group III nitride compound semiconductor layer, thereby overcoming the rejection of claims 1-3 and 7-19 under 35 U.S.C. § 112, second paragraph, below. Applicant submits that, since these claims have been searched and considered, and since allowable claims 19, 20, 21, and 23 already recite a "p-type Group III nitride compound semiconductor layer", which has been searched and considered, no further search and consideration should be necessary to enter and consider the amendments to claims 1-3, 11, and 16. Thus, the Examiner is requested to enter and consider the amendments to claims 1-3, 11, and 16.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant

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specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 1-3 and 7-18 stand rejected under 35 U.S.C. § 112, second paragraph.

Claim 1 stands rejected under 35 U.S.C. § 102(e) as being anticipated by JP 11-74558.

These rejections are respectfully traversed in the following discussion.

## **I. THE CLAIMED INVENTION**

In the conventional devices the contact resistivity of the electrode generally is high and it generally is impossible to obtain an ohmic junction when metal is formed simply on the semiconductor surface.

The claimed invention, on the other hand, solves the problems with the conventional devices by addressing the substance of the compound semiconductor/metal boundary and the relation with the metal boundary structure.

For example, in an exemplary aspect of the claimed invention, as defined for example, by independent claim 1, an electrode for a p-type Group III nitride compound semiconductor layer, including a film including polycrystalline metal, wherein the polycrystalline metal includes a transition metal.

In another exemplary aspect of the invention, as defined for example by independent claim 11, an electrode for a p-type Group III nitride compound semiconductor includes a polycrystalline metal film disposed on the p-type Group III nitride compound semiconductor layer to form a metal/semiconductor boundary. The polycrystalline metal film includes a fiber structure in which a crystal grain boundary

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density decreases such that a quantity of defects in the metal/semiconductor boundary decreases. The polycrystalline metal film includes a transition metal.

Thus, the claimed invention provides an electrode having a lower contact resistance to p-type group III nitride compound semiconductor than conventional electrodes. Moreover, the electrical characteristics of the electrode according to the claimed invention are improved greatly (e.g., see Abstract).

The claimed invention also reduces the height of the Schottky barrier between the compound semiconductor and the metal by the strong orientation force of the metal, such that the value of contact resistance in the boundary between the p-type Group III nitride compound semiconductor and the metal can be reduced greatly (e.g., see specification at page 6, lines 12-18).

## II. THE 35 U.S.C. §112, SECOND PARAGRAPH REJECTION

Claims 1-3 and 7-18 stand rejected under 35 U.S.C. §112, second paragraph.

Applicants respectfully submit that claims 1-3 and 7-18 would be clearly understandable to the ordinarily skilled artisan, in view of the specification, drawings, and in the context of the claims.

However, to speed prosecution, Applicants amend claims 1-3, 11, and 16 to define more clearly and particularly that the claimed electrode is for a p-type Group III nitride compound semiconductor layer, thereby overcoming the rejection of claims 1-3 and 7-18 under 35 U.S.C. § 112, second paragraph.

Therefore, the Examiner is requested to reconsider and withdraw this rejection.

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### III. THE PRIOR ART REJECTION

Claim 1 stands rejected under 35 U.S.C. § 102(e) as being anticipated by JP 11-74558.

In the present Office action, the Examiner alleges that JP 11-74558 teaches the claimed invention. Particularly, the Examiner alleges that Figures 1-4, including the electrodes 11 and 12, of JP 11-74558, and also the Abstract of JP 11-74558, teach all of the features of claim 1 (see Office Action at page 3, last three paragraphs).

Applicants respectfully submit, however, that there are elements of the claimed invention which clearly are not disclosed or suggested by JP 11-74558.

For example, JP 11-74558 merely discloses a polycrystal GaN layer 10 which is disposed between a p-GaN contact layer 9, and a Pt electrode 11 and Au electrode 12.

In JP 11-74558, the electrodes 11 and 12 include a transition metal (i.e., Pt electrode 11 and Au electrode 12). JP 11-74558 does not, however, disclose or suggest that the polycrystal layer 10 includes a transition metal.

That is, JP 11-74558 discloses that the electrodes 11 and 12 (which do not include polycrystalline metal) include transition metals, not that the polycrystal layer 10 includes a transition metal.

In comparison, independent claim 1 recites:

*[a]n electrode of a p-type Group III nitride compound semiconductor light-emitting layer, comprising:*

*a film including a polycrystalline metal*

*wherein said polycrystalline metal comprises a transition metal*

(emphasis added).

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That is, as clearly recited in independent claim 1, the electrode includes a polycrystalline metal film which includes a transition metal. In other words, in the claimed invention as defined, for example, by independent claim 1, the polycrystalline metal film includes a transition metal.

In JP 11-74558, the polycrystal layer 10 clearly does not include a transition metal.

Thus, JP 11-74558 clearly does not disclose or suggest all of the features of independent claim 1. Accordingly, JP 11-74558 clearly does not anticipate, or for that matter render obvious, all of the features of independent claim 1.

The Examiner respectfully is requested to reconsider and withdraw this rejection.

#### IV. CONCLUSION AND FORMALITIES

The Examiner objects to the Title of the Invention. Applicants amend the Title to obviate this objection. Therefore, the Examiner is requested to reconsider and withdraw this objection.

In view of the foregoing, Applicant submits that claims 1-3 and 7-23, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

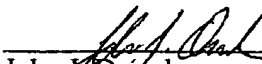
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The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: JULY 28, 2005


  
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**CERTIFICATE OF TRANSMISSION**

I certify that I transmitted via facsimile to (703) 872-9306 the enclosed Amendment under 37 C.F.R. § 1.116 to Examiner Alexander O. Williams, Art Unit 2826 on July 28, 2005.

  
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